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The RED-NECKED RASPBERRY CANE-BORER

A "FLAT-HEADED," milk-white borer, the larva or young of a small, slender, black beetle with bronze-red head and coppery red or golden thorax ("neck"), causes a reduction in the crops of raspberry, blackberry, and dewberry in the eastern half of the United States by its injury to the canes. The beetle, also, does some injury by feeding on the leaves of the plants.

This insect may be controlled by cutting out the infested canes in the fall or winter, or in early spring before the beetles have emerged from them, and promptly burning the cuttings. Cooperation in the observance of this measure, including the same precautions on wild plants, for successive years, is highly desirable.

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THE RED-NECKED RASPBERRY CANE-BORER.[1]

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INJURIOUS WORK OF THE BORER.

THE young canes of raspberry, blackberry, and dewberry are subject to injury by the larva, or young, of a small, short-horned beetle, known as the red-necked raspberry cane-borer, or raspberry gouty-gall beetle. This larva, or borer, forms irregular swellings, or galls, from 1 to 3 inches in length, consisting of gradual enlargements of the canes and splitting of the bark. The canes so infested either die or become weakened to such an extent that the crop fails to develop.

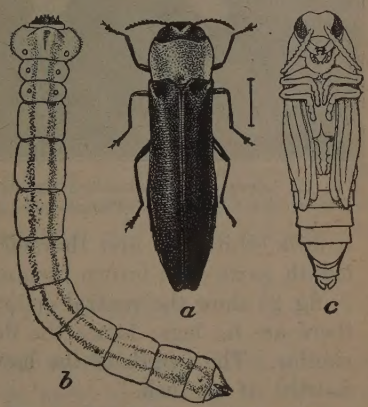

FIG. 1.—Red-necked raspberry cane-borer; *a*, Beetle; *b*, larva, ventral view; *c*, pupa. Magnified about 6 times.

DESCRIPTION OF THE INSECT.

THE BEETLE.

From all related insects the beetle, which produces this borer, can be readily distinguished by its beautiful coppery-red or golden thorax ("neck"), which has given it its name. It is of moderate size, averaging a little more than one-fourth of an inch (5.5 to 7 milli-

[1] *Agrilus ruficollis* Fab.; order Coleoptera, family Buprestidae.

meters) in length. Its elongate-cylindrical form and most characteristic features are shown in the accompanying illustration. (Fig. 1, *a*.) The ground color is dull bronze black on the lower surface, the head is bronze red, and the wing-covers are a beautiful velvety black. The entire upper surface, as seen under a magnifying glass, is finely and beautifully sculptured. The antennæ (feelers) and legs are short and slender, the former saw-toothed and the latter ending in a pair of claws divided at the tips. This species is quite distinct from the two-spotted raspberry cane-borer[2] which belongs to the long-horned borers.[3]

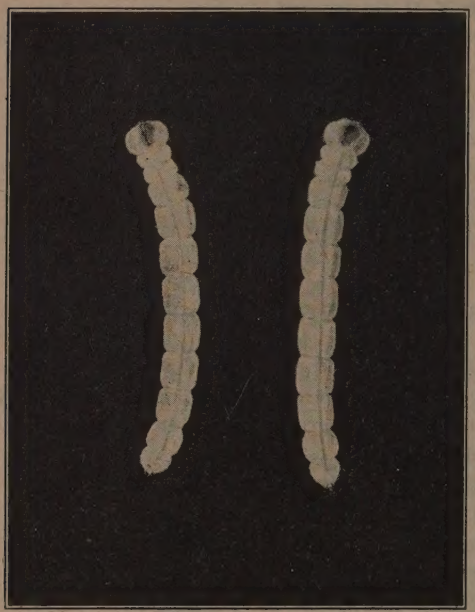

FIG. 2.—Larvæ of the red-necked cane-borer, ventral view. Much enlarged. (Photographed by Gentner.)

THE LARVA.

The larva (fig. 1, *b;* fig. 2) is one of the flat-headed borers and is a singular looking object. The body is elongate and flattened, and the first thoracic segment, which is apt to be mistaken for the head—as the latter can be withdrawn into it—is prominent, being much flattened and widened at the sides, whereas the last segment of the abdomen terminates in a pair of slender, dark brown, toothed, forcepslike processes. The general color is milk white, the first thoracic segment being pale yellow and the mouth parts dark brown turning to black. The illustrations (fig. 1, *b;* fig. 2) show the ventral or lower surface, and it will be noted that there are no legs; hence the dorsal and ventral surfaces are quite similar. The length of the larva is between five-eighths and three-fourths of an inch.

THE PUPA.

The pupa (fig. 1, *c*) is of about the same length as the beetle, and shows in retracted form many of its characters.

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[2] *Oberea bimaculata* Oliv.

[3] Family Cerambycidae.

DISTRIBUTION, FOOD PLANTS, AND EXTENT OF INJURY.

The species is of wide distribution, being found in both warm and cool latitudes from Canada and New England westward to Minnesota and southward to the Gulf States, covering nearly the entire eastern half of the United States. (See fig. 3.)

This cane-borer does not feed, so far as is known, on any plants other than those mentioned, although there are at least three somewhat doubtful reports of its breeding on rose. It attacks practically all varieties of blackberry, raspberry, and dewberry, and when numerous is always injurious, whether occurring on wild or culti-

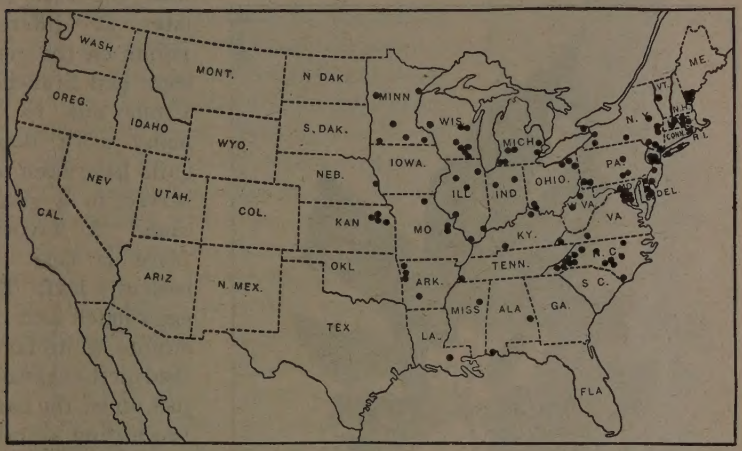

FIG. 3.—Known distribution of red-necked raspberry cane-borer.

vated plants. As an instance of damage, in 1892 hundreds of acres of blackberries about Hammonton, N. J., were so badly injured by this cane-borer that 25 per cent reduction of the crop for 1893 was predicted.

INJURY BY THE BEETLE.

While injury is due mainly to the larva boring within the canes, the adults of the cane-borer also do harm by feeding on the leaves. They attack by preference young, bright green foliage, and may either notch the leaves or cut small rounded holes in them. Their work is irregular, but it is unmistakable, as they feed exclusively on the upper surface and leave considerable quantities of excrement upon the leaves. In time the attacked leaves wither and die prema-

turely. Figure 4 illustrates a leaf some time after the attack of the beetle. The beetles do not appear to be at all particular whether the plants attacked are in sunlight or in shade, in this respect differing from many other species of the same family.

SEASONAL HISTORY AND HABITS.

The beetles make their first appearance in the District of Columbia and vicinity some years as early as the first week in May. In more northern regions they appear some time in June, continuing until August, the time of appearance being coincident with the blooming of the raspberry. They deposit their eggs on young growth, first near the root and later at different points on the main stem and branches. From one to as many as a dozen galls have been observed in a single cane. A favorite place is near the base of a leaf. The eggs hatch and the minute white larvæ feed on the sapwood just under the bark, proceeding spirally upward or downward in the sapwood and around the cane, girdling it and thereby causing its death. Where this girdling takes place the galls are formed. (See fig. 5.) Sometimes larvæ may be present in the stems without the formation of galls. Still later the larvæ bore into the pith, continuing upward or downward. After proceeding from 4 to 8 inches in the canes they form oval pupal cells in the pith near the woody part and in these the larvæ pass the winter. In March they molt, forming shorter, or prepupal, larvæ, and in April molt again and change to pupæ, in this stage remaining inactive for from 7 to 10 days, according to temperature, the beetles developing toward the end of April and issuing in May and until July.

FIG. 4.—Blackberry leaf taken some time after attack by beetles of the red-necked raspberry cane-borer, showing enlargement of original holes made by the beetles in feeding.

The pupal cell may be only a short distance above the ground; it may be a few inches only below the first gall, or in rare cases above the gall.

A single generation is produced annually.

NATURAL ENEMIES.

This species, like most interior feeders, attracts certain parasites, two[4] of which, small four-winged wasplike flies, are common and undoubtedly are material factors in reducing the numbers of the pest.

FIG. 5.—Section of blackberry cane showing gall or enlargement at middle, caused by larva of red-necked raspberry cane-borer.

REMEDY.

The only direct method for the control of the red-necked raspberry cane-borer consists in cutting out the infested canes, which may be detected by the galls or enlargements on them. This may be done in the late fall, in winter, or in spring, or at any time before the latter part of April in most localities where the insect is injurious, and the cuttings should be promptly burned. As the beetles begin to emerge from the canes early in May they are, by the means indicated, destroyed before their emergence. Thus considerable diminution in injury will follow for the season.

To insure thoroughness, however, it is necessary to employ the same means on all of the insect's food plants—blackberry, dewberry, and raspberry—and, where possible, to extend this operation to wild plants of the same kind. Otherwise the wild plants, unless of value for fruit, should be kept down, since it is principally in volunteer growth and neglected berry patches that the insect breeds.

Cooperation in the observance of this measure with neighboring growers of these fruits is highly desirable and should be continued for successive years, or as long as the galls or swellings are to be seen in any number.

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[4] *Microbracon xanthostigmus* Cress. and *Charitopus magnificus* Ashm.